

Selection of Exercise Systems and Development of a Training Plan to Improve Speed-Strength for Male Volleyball Athletes Aged 14–15 at the Hanoi Sports Training and Competition Center

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Abstract— This study was conducted to select a system of speed-strength training exercises for male volleyball athletes aged 14–15 at the Hanoi Sports Training and Competition Center. Based on the review of specialized documents, investigation of current training practices, and interviews with 40 experts, coaches, and volleyball lecturers, the study identified 36 speed-strength development exercises suitable for the physiological, psychological, and professional characteristics of young athletes. The exercise system was classified into three groups: weight and resistance exercises; plyometric and speed exercises; and volleyball-specific technical exercises associated with speed-strength development. In addition, a 12-month speed-strength training program was developed following the principles of specialization and modern periodization. The research findings indicated that the selected exercise system possessed high scientific value, practicality, and feasibility, meeting the requirements for improving speed-strength performance in young male volleyball athletes during the initial stage of sports specialization.

I. INTRODUCTION

In modern volleyball, speed-strength is one of the most important motor qualities determining technical efficiency and competitive performance. Specialized activities such as spike jumping, blocking, counterattack movement, and transition play require athletes to generate maximum force within the shortest possible time. Particularly for male volleyball athletes aged 14–15, this stage is characterized by rapid neuromuscular development, enhanced technical acquisition ability, and fast motor adaptation, creating favorable conditions for speed-strength development.

However, current training practices at youth volleyball clubs and training centers indicate that the selection of speed-strength exercises is still largely based on coaches' personal experience, lacking systematic organization and insufficiently matching the biological

development characteristics of young athletes. Many training programs focus excessively on training volume while paying inadequate attention to movement quality and the specificity of speed-strength in modern volleyball.

Derived from this practical context, the study aimed to select a system of speed-strength exercises for male volleyball athletes aged 14–15 at the Hanoi Sports Training and Competition Center in order to improve the effectiveness of specialized physical training for the research subjects.

The study employed the following research methods: document review, interviews and discussions, pedagogical testing, and statistical mathematics.

II. RESULTS AND DISCUSSION

2.1. Selection of Speed-Strength Exercise Systems for Male Volleyball Athletes Aged 14–15 at the Hanoi Sports Training and Competition Center

Based on the synthesis of domestic and international specialized documents, combined with practical surveys conducted at provincial, municipal, and sectoral volleyball clubs, the study collected 46 exercises aimed at developing speed-strength for young volleyball athletes. These exercises were classified into three groups: the weight-training group consisting of 12 exercises; the supplementary speed-strength development group

consisting of 12 exercises; and the spike technique training group associated with speed-strength development consisting of 14 exercises. This classification ensured systematic organization and comprehensively reflected the components constituting speed-strength in modern volleyball, ranging from muscular strength foundations and movement speed to the application of speed-strength in specialized technical skills.

To ensure objectivity in exercise selection, interviews were conducted with 40 experts, coaches, and volleyball lecturers. The obtained results are presented in Table 1.

Table 1. Results of the First Interview on Selecting Speed-Strength Development Exercises for Male Volleyball Athletes Aged 14–15 at the Hanoi Sports Training and Competition Center (n = 40)

No	List of Exercises	List of Exercises 1 (%)	List of Exercises 2 (%)	List of Exercises 3 (%)	Note
I	Weight and Resistance Exercise Group (12 Exercises)				
1	Push Press	92.5	7.5	0	Selected
2	Standing Barbell Press	90.0	10.0	0	Selected
3	Rapid Barbell Squat	75.0	25.0	0	Selected
4	Snatch	85.0	15.0	0	Selected
5	Progressive Half Squat	72.5	27.5	0	Selected
6	Standing Bent-Over Rapid Barbell Pull	75.0	25.0	0	Selected
7	Overhead Medicine Ball Throw	77.5	22.5	0	Selected
8	Medicine Ball Slam	80.0	20.0	0	Selected
9	Rapid Hip Extension with Barbell Lift	30.0	62.5	7.5	Selected
10	Rapid Biceps Curl	72.5	27.5	0	Selected
11	Fixed-Leg Body Raise	15.0	70.0	15.0	Selected
12	Bench Press	70.0	30.0	0	Selected
II	Plyometric and Speed-Supplementary Exercise Group (12 Exercises)				
13	Depth Jump	87.5	12.5	0	Selected
14	Speed Hurdle Jump	85.0	15.0	0	Selected
15	Variable-Speed Jump Rope Exercise	92.5	7.5	0	Selected
16	Resistance-Band Spike Simulation	90.0	10.0	0	Selected
17	30-m Sand Sprint	82.5	17.5	0	Selected
18	Explosive Push-Ups in Prone Position	85.0	15.0	0	Selected
19	Continuous Box Jumps	77.5	22.5	0	Selected
20	30-m Sprint from a Standing Start	62.5	37.5	0	Excluded
21	Rapid Pull-Ups	72.5	27.5	0	Selected
22	Weighted Vest Jumping (5% Body Weight)	75.0	25.0	0	Selected
23	Rapid Sit-Ups for 30 Seconds	55.0	45.0	0	Excluded
24	Horizontal Resistance-Band Pull Exercise	20.0	67.5	12.5	Selected
III	Sport-Specific Speed-Strength Technical Exercise Group (12 Exercises)				

No	List of Exercises	List of Exercises 1 (%)	List of Exercises 2 (%)	List of Exercises 3 (%)	Note
25	Maximum-Speed Approach Jump Drill	95.0	5.0	0	Selected
26	Combined Approach and Reactive Jump Drill	92.5	7.5	0	Selected
27	Standing Attack Drill (Wrist Development)	87.5	12.5	0	Selected
28	Resistance-Band Spiking Exercise	82.5	17.5	0	Selected
29	Self-Toss Approach Attack Drill	75.0	25.0	0	Selected
30	Approach Run Simulation for Quick Attack	77.5	22.5	0	Selected
31	Transition Attack Drill	72.5	27.5	0	Selected
32	Blocked Attack Drill (Rapid Reaction)	40.0	60.0	0	Selected
33	Whistle-Signal Attack Drill (Reaction Speed)	12.5	87.5	0	Selected
34	Continuous One-Step Approach Spiking Drill	25.0	70.0	5.0	Selected
35	Continuous Three-Step Approach Spiking Drill	45.0	52.5	2.5	Selected
36	Quick Attack from the Setter	70.0	30.0	0	Selected
37	Moving-Target Spiking Drill	30.0	65.0	5.0	Selected
38	Three-Position Combination Attack Drill	15.0	75.0	10.0	Selected

To confirm the stability of the results, a second round of interviews was conducted. The findings showed a clear convergence of opinions toward the 36 identified exercises.

Table 2. Summary of the 36 Officially Selected Exercises (Average Results from Two Interview Rounds)

No	List of Exercises	List of Exercises (TB)	List of Exercises (TB)	Summary
I	Weight Training and Medicine Ball Exercise Group (12 BT)			
1-8	Push press, snatch, squat, and medicine ball throw exercises	> 75.0%	-	8 BT
9-12	Rapid hip extension with barbell lift, rapid biceps curl, fixed-leg body raise, and bench press exercises	-	> 65.0%	4 BT
II	Plyometric and Speed Exercise Group (12 BT)			
13-20	Depth jumps, speed hurdle jumps, jump rope exercises, sand running, etc	> 70.0%	-	8 BT
21-24	Pull-up bar exercises, weighted vest exercises, resistance-band exercises, etc	-	> 62.0%	4 BT
III	Speed-Strength Technical Exercise Group (12 BT)			
25-30	Approach jump exercises, resistance-band spiking exercises, quick attack drills, etc	> 75.0%	-	6 BT
31-36	Command-based attack drills, blocked attack drills, rebound-ball attack drills, etc	-	> 60.0%	6 BT
Total	Experimental Exercise System			36 BT

Based on the interview results presented in Tables 1 and 2, the experts and coaches demonstrated a high level of agreement in selecting the speed-strength exercise system for male youth volleyball athletes aged 14–15.

Modern exercises such as depth jumps and speed hurdle jumps were highly evaluated due to their effectiveness in enhancing the stretch-shortening cycle, reducing ground

contact time, and improving explosive force production capacity.

The selected exercise system also emphasized the development of whole-body force transmission through medicine ball exercises, thereby contributing to increased spiking speed and power. In addition, resistance-band exercises demonstrated a high level of specificity, helping athletes improve arm-swing speed, maintain muscle contraction velocity, and reduce stress on the shoulder joints of young athletes.

Furthermore, the structure of the 36 exercises ensured diversity and a harmonious combination of supplementary and sport-specific exercises under actual competition conditions. As a result, the program not only enhanced speed-strength development but also improved athletes' tactical coordination abilities. These findings

provided an important basis for developing the 12-month experimental training program for the research subjects.

2.2. Development of a Speed-Strength Training Plan for Male Youth Volleyball Athletes Aged 14–15 in Hanoi

Based on the training curriculum, annual training plan, and existing instructional system of the men's volleyball team at the Hanoi Sports Training and Competition Center, the study developed a systematic speed-strength training plan for the experimental group in accordance with the research objectives. At the same time, in order to ensure objectivity and practical applicability, interviews were conducted with experts, coaches, and lecturers regarding the duration and weekly frequency of speed-strength training sessions. The results are presented in Tables 3 and 4.

Table 3. Duration of Speed-Strength Training in a Single Training Session for Male Youth Volleyball Athletes Aged 14–15 in Hanoi (n = 60)

No	Duration of Training (minutes)	Highly Appropriate		Appropriate		Not Appropriate	
		n	%	n	%	n	%
1	From 20 to 25 minutes	39	65	15	25	6	10
2	From 25 to 30 minutes	42	70	9	15	9	15
3	From 30 to 35 minutes	60	100	0	0	0	0
4	From 35 to 40 minutes	42	70	15	25	3	5
5	From 40 to 45 minutes	39	65	12	20	9	15

Table 4. Weekly Frequency of Speed-Strength Training Sessions for Male Youth Volleyball Athletes Aged 14–15 in Hanoi (n = 60)

No	Number of Training Sessions per Week	Highly Appropriate		Appropriate		Not Appropriate	
		n	%	n	%	n	%
1	Two sessions	39	65	12	20	9	15
2	Three sessions	57	95	3	5	0	0
3	Four sessions	42	70	9	15	9	15
4	Five sessions	42	70	15	25	3	5
5	Six sessions	24	40	18	30	18	30

The results presented in Tables 3 and 4 indicated that the majority of experts, coaches, and lecturers agreed that the appropriate duration for speed-strength training sessions for male youth volleyball athletes aged 14–15 was 30–35 minutes per session, with the “very appropriate” option receiving 100% agreement. The most suitable training frequency was identified as three sessions per week, accounting for 95% of the respondents' opinions.

Based on these findings, together with the 36 selected speed-strength exercises (BT1–BT36), the study developed an annual periodized training plan to ensure a rational distribution among training phases, consistent with the principles of biological adaptation and the developmental characteristics of young athletes. The training plan is presented in Tables 5 and 6.

Table 5. Twelve-Month Speed-Strength Training Plan for Male Volleyball Athletes Aged 14–15 at the Hanoi Sports Training and Competition Center

No	Exercise Group	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
	Week	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1	BT1	x x x x	x x x x	x x x x	x x x x	x x _ _	x x _ _	_____	_____	_____	_____	_____	_____
2	BT2	x x x x	x x x x	x x x x	x x x x	x x _ _	x x _ _	_____	_____	_____	_____	_____	_____
3	BT3	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	_____	_____	_____	_____
4	BT4	x x x x	x x x x	x x x x	x x x x	_____	_____	_____	_____	_____	_____	_____	_____
5	BT5	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	_____	_____	_____	_____
6	BT6	x x x x	x x x x	x x x x	x x x x	_____	_____	_____	_____	_____	_____	_____	_____
7	BT7	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x
8	BT8	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x
9	BT9	_____	_____	x x x x	x x x x	x x x x	x x x x	_____	_____	_____	_____	_____	_____
10	BT10	x x x x	x x x x	x x x x	x x x x	_____	_____	_____	_____	_____	_____	_____	_____
11	BT11	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	_____	_____	_____	_____
12	BT12	x x x x	x x x x	x x x x	x x x x	x x _ _	x x _ _	_____	_____	_____	_____	_____	_____
13	BT13	_____	_____	_____	_____	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x
14	BT14	_____	_____	_____	_____	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x
15	BT15	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x
16	BT16	_____	_____	_____	_____	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x
17	BT17	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	_____	_____	_____	_____	_____	_____
18	BT18	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	_____	_____	_____	_____
19	BT19	_____	_____	_____	_____	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x
20	BT20	_____	_____	_____	_____	_ _ x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x
21	BT21	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	_____	_____	_____	_____
22	BT22	_____	_____	_____	_____	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x
23	BT23	_____	_____	_____	_____	x x x x	x x x x	x x x x	x x x x	_____	_____	_____	_____
24	BT24	_____	_____	_____	_____	x x x x	x x x x	x x x x	x x x x	_____	_____	_____	_____
25	BT25	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x
26	BT26	_____	_____	_____	_____	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x
27	BT27	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x
28	BT28	_____	_____	_____	_____	_____	_____	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x
29	BT29	_____	_____	_____	_____	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x
30	BT30	_____	_____	_____	_____	_____	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x
31	BT31	_____	_____	_____	_____	_____	_____	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x
32	BT32	_____	_____	_____	_____	_____	_____	_____	_____	x x x x	x x x x	x x x x	x x x x
33	BT33	_____	_____	_____	_____	_____	_____	_____	_____	x x x x	x x x x	x x x x	x x x x
34	BT34	_____	_____	_____	_____	_____	_____	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x
35	BT35	_____	_____	_____	_____	_____	_____	_____	x x x x	x x x x	x x x x	x x x x	x x x x
36	BT36	_____	_____	_____	_____	_____	_____	_____	_____	x x x x	x x x x	x x x x	x x x x
IV	Testing and Competition												
37	Periodic Evaluation	_ _ _ x	_____	_____	_ _ _ x	_____	_____	_____	_ _ _ x	_____	_____	_____	_ _ _ x

No	Exercise Group	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
		Week	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
38	2 vs. 2 and 3 vs. 3 Matches	x _ x _	x _ x _	x _ x _	x _ x _	x _ x _	x _ x _	x _ x _	x _ x _	x _ x _	x _ x _	x _ x _	x _ x _
39	Competition 6:6 ³	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x

The speed-strength training process was developed based on the 36 selected exercises, following the principles of modern periodization and in accordance with the psychological and physiological characteristics of athletes aged 14–15. The training plan was divided into three phases: the accumulation and foundation-building phase (Months 1–4), which focused on developing maximal strength through weight-training and resistance exercises; the conversion and power-development phase (Months 5–8), which emphasized plyometric, reflexive, and elastic-resistance exercises to enhance rapid force production; and the refinement and competition-application phase (Months 9–12), which concentrated on sport-specific technical exercises under competitive conditions in order to transfer speed-strength into practical performance effectiveness.

In addition, a system of periodic evaluations was conducted in Months 4, 8, and 12 to assess athletes' adaptation and appropriately adjust training loads for each athlete. Overall, the training process ensured continuity, systematic organization, and specificity, thereby contributing to sustainable speed-strength development and improved spiking performance in young volleyball athletes.

III. CONCLUSION

Through the research process, the study successfully selected a system of 36 speed-strength development exercises suitable for male volleyball athletes aged 14–15 at the Hanoi Sports Training and Competition Center. In addition, a 12-month periodized training plan was developed, ensuring scientific validity, systematic organization, and suitability to the specialized characteristics of the research subjects.

REFERENCES

- [1] Klesep, Iu.N., Airianx, A.G. (1997). *Volleyball*. Translated by Dinh Lam, Xuan Nga, Huu Hung, and Nghiem Thuc. Sports Publishing House, Hanoi.
- [2] Ngo Trung Luong, Phan Hong Minh (1965). *Training Plans for Volleyball Athletes*. Vietnam Volleyball Association.

- [3] Tran Hung (2008). *Research on the Development of Speed-Strength in Spiking Techniques of Male Volleyball Athletes Aged 14–17*. Doctoral Dissertation, Institute of Sports Science, Hanoi.